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# Readiness and willingness to provide immunization services: a survey of community pharmacists in Riyadh, Saudi Arabia

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## Abstract

**Background:** Immunization rates among the adult population in Saudi Arabia fall below desired targets, urging the need to expand this service in the community. Community pharmacists are recognized as highly accessible healthcare professionals, and community pharmacies—because of the convenient location and extended working hours—offer a unique place to provide a vaccination service. The aims of this study were to assess community pharmacists' readiness and willingness to provide an immunization service and to identify the factors that may support the implementation of such service in Riyadh region, Saudi Arabia.

**Methods:** This study was a cross-sectional paper-based survey conducted in the community pharmacy setting in Riyadh region between February and April 2016. A questionnaire was developed to determine the pharmacists' readiness and willingness to provide immunization services. A convenience sample of community pharmacists from five different parts of Riyadh was reached and invited to participate.

**Results:** Of the 179 invited community pharmacists, 139 completed the survey (response rate was 77.7%). Of the 139 respondents, 76 (55%) expressed their willingness to administer vaccines and establish an immunization service. Among the participants that had shown willingness, many explained their reasons in accepting this role, including their accessibility in the community (56/57, 98.3%) and the possibility of expansion in the rate of immunization coverage in certain age group, such as the elderly (47/51, 92.2%). The remaining 63 (45%) respondents who were not willing and ready to provide immunization services mainly agreed that a lack of training (46/61, 75.4%) and concerns in maintaining patient safety (31/46, 67.4%) were considered as barriers to deliver immunization services. Most importantly, continuous professional education and training workshop on immunization and pharmacist's interest were the main drivers of immunization service implementation.

**Conclusion:** Community pharmacists working in Saudi Arabia are willing to provide immunization services. However, overcoming the barriers identified in this study is a key to success in any future planning for implementing immunization services in the community pharmacy setting. Future larger studies are also needed to explore patients' willingness and acceptability to use this service from community pharmacists.

**Keywords:** Community pharmacists, Willingness, Vaccines, Immunization services, Saudi Arabia

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## Background

Immunizations are recommended throughout the person's lifetime to prevent vaccine-preventable diseases and their sequelae and are an integral part of communicable disease control worldwide [1]. Particularly, the prevalence of illness attributable to vaccine-preventable diseases is greater among adults than among children [2]. Yet, adult immunization coverage remains low for most routinely recommended vaccines and below targets even in countries such as the United States of America (USA) [1, 2]. As a result of the low uptake of adult immunizations—also resulted in important human and economic consequences—it is now taken as a public health priority [3]. For example, in the USA alone, the economic burden associated with vaccine-preventable diseases was estimated at about \$9 billion in 2015, and almost 80% of the financial burden (\$7.1 billion) was due to unvaccinated adults [4].

According to the Center for Communicable Disease Control (CDC), eight vaccines have been recommended for adults to protect against 11 diseases, and an additional five vaccines can be used with specific medical conditions or activities [5]. Of all the adult vaccines, influenza vaccine is the only one now recommended for all adults, while other target-specific adult vaccines were based on patient-specific behavior and medical conditions [1]. Although influenza vaccine has been proven to reduce hospital admission and influenza-related complications, the immunization rate worldwide still remains suboptimal [6, 7]. Like the majority of the countries worldwide, adult immunization rate in Saudi Arabia falls below the desired targets, urging the need to expand this service nationally [8, 9]. In the literature, many barriers have been identified as factors that may contribute to this low immunization rate including the lack of patient knowledge and believe about the safety and efficacy of vaccines, inconvenient location and visiting hours for the immunization service, and longer waiting periods [10, 11]. For instance, influenza requires immunization rate of at least 80% to establish herd immunity, and achieving this level of immunization requires a new approach such as increasing community awareness about the importance of immunization and increase accessibility to immunization services [12].

To increase accessibility to immunization services, in the last few years, community pharmacists have been providing immunization services in many developed countries such as the USA, the United Kingdom (UK), Australia, Canada, and New Zealand [13–17]. Community pharmacists are recognized as highly accessible healthcare professionals, and community pharmacies—because of the convenient location and extended working hours—provide a significant venue to provide an immunization service [18, 19]. There is also evidence that pharmacy-led

immunization programs can lead to an increase in the uptake of immunizations compared with usual care [20]. Although community pharmacies play an important role in any healthcare system to overcome some of the barriers—for example, among hard to reach groups and those who live in rural areas [21, 22]—and pharmacists can play a key role in facilitating the uptake of immunization services and promoting patient education regarding the importance of immunization. Yet, community pharmacists' readiness and willingness to provide such services have not been explored in Saudi Arabia. Pharmacists in Saudi Arabia are currently not authorized to administer vaccines. Allowing pharmacists to provide vaccination service is a controversial issue. However, recently, Ministry of Health (MOH) has considered an expansion and authorization in the role of pharmacists in immunization services. Still, it is unclear when this service will be implemented. Thus, the main purposes of this study were to assess the readiness and willingness of the community pharmacists' to provide an immunization service and to identify the barriers involved in implementing such service in Saudi Arabia.

## Methods

### Survey development

This study was a cross-sectional paper-based survey that was conducted anonymously in the community pharmacy setting in Riyadh, Saudi Arabia, between February and April 2016. A quantitative questionnaire was developed to determine the pharmacists' readiness and willingness in providing immunization services. The survey was developed based on an extensive search of the literature. Initially, the first draft of the study questionnaire was voluntarily reviewed by three clinical academic experts (with prior experience of tool development) to review the survey for any suggestions or amendments. The second draft of the survey was then sent to a group of community pharmacists to pilot the survey and sought further changes. Minor changes were received by the two groups and amended accordingly, and then, the survey was finalized for distribution.

### Data collection

Data collection included information on participating pharmacists' demographics and their willingness to provide immunization and the barriers that may potentially influence community pharmacists' decision in providing immunization services in the community pharmacy setting, that is, participants were made to report the reasons for their willingness, or lack thereof, to provide immunization services, as well as the deriving factors for the implementation of such services. Apart from the background variables, the response to each item in the

questionnaire was assessed using a 2-point Likert scale of agreement (1, “agree”; 2, “disagree”).

A convenience sample of community pharmacists across the different geographical parts of Riyadh, Saudi Arabia, was randomly selected and invited to participate in this study. Participated pharmacies varied markedly in space, prescription volume, and the population of serviced areas. Community pharmacies from different geographical locations including Northern suburbs, Southern suburbs, Western suburbs, Eastern suburbs, and Central suburbs in Riyadh were selected for the study. This provided us with sufficient data to enable us to determine the readiness and willingness of pharmacists to provide an immunization service to their community.

#### Data analysis

Received surveys were entered into a custom-built Excel database and cleaned by the first author before the data were transferred to SPSS. Descriptive statistics were used to illustrate respondents' demographic characteristics and responses to the survey questions. Continuous variables were presented as means and standard deviation ( $\pm$  SD) for normally distributed variables. Categorical variables were presented as frequencies and percentages. All statistical analyses were performed using SPSS statistical software for Windows version 21 (SPSS Inc., Chicago, USA).

#### Results

Of the 179 community pharmacists who received the questionnaire, 139 completed the survey (response rate, 77.7%). All participated pharmacists were males, mean age was  $31.9 \pm 5.5$  years, and the majority of respondents hold a bachelor degree in pharmacy, 131 (94.2%). Participants were predominantly from chain pharmacies, 126 (90.6%), and had  $7.9 \pm 5.8$  years of experience (Table 1).

Although the overall response rate for the questionnaire was calculated to be 77.7%, response rates for individual items ranged from 28.8 to 96.8% (Tables 2, 3, and 4). The low response rate (28.8%) was reported from the item “financial reimbursement or adequate remuneration” when community pharmacists ( $n = 139$ ) were asked about the most important elements needed for implementation of immunization services, whereas the highest response rate (96.8%) was recorded from the item “lack of training” when only unwilling pharmacists were requested to express their reasons (and/or barriers) for providing immunization services.

Of the 139 pharmacists, 76 (55%) of the respondents expressed their willingness to administer vaccines and readiness to establish an immunization service in their current pharmacies. Those pharmacists who were willing and ready to provide immunization services were asked about the reasons why they are best suited for the immunization. Many believed that community pharmacists

**Table 1** Demographic characteristics of participants ( $n = 139$ )

Variables	$n$ (%)
Type of pharmacy	
Chain	126 (90.6)
Independent	13 (9.4)
Specialty classification*	
Pharmacist	125 (89.9)
Pharmacist 1	14 (10.1)
Qualification**	
B.Pharm	131 (94.2)
Pharm.D	3 (2.2)
Graduate diploma	2 (1.4)
Master degree	1 (0.7)
PhD	2 (1.4)
Age***	$(31.8 \pm 5.5)$
Years of experience***	$(7.9 \pm 5.8)$

\*According to Saudi Commission for Health Specialties; pharmacist 1 (senior pharmacist > 3 years of experience)

\*\*B.Pharm (Bachelor in Pharmacy); Pharm.D (Doctor of Pharmacy)

\*\*\*Mean  $\pm$  SD

are easily accessible to the community (56/57, 98.3%) and can possibly increase the rate of immunization among the certain age group of patients, such as the elderly (47/51, 92.2%) (Table 2).

On the other hand, community pharmacists who were totally unwilling to provide immunization services (63/139, 45%) were asked about the barriers hindering their willingness to provide vaccinations in the community setting. Multiple limiting factors to provide immunization services by community pharmacists were identified and were mainly a lack of training to deliver these services (46/61, 75.4%) and the belief that patient safety may be compromised (31/46, 67.4%) (Table 3).

Finally, all pharmacists (willing and unwilling) were also requested to report the most important elements for the implementation of immunization service in their premises, and were found that continuous professional education and training workshop on immunization (60/63, 95.2%) and pharmacist's interest (45/49, 91.9%) have been agreed frequently (Table 4).

#### Discussion

This is the first study to explore the community pharmacists' readiness and willingness in providing immunization services in Saudi Arabia. More than half of the participated pharmacists showed their willingness to provide this service. In addition to the easiness of accessibility, community pharmacists believed that they have a strong role in increasing the rate of immunization particularly for older patients besides to their role in advertising, promoting, and improving the vaccination service through

**Table 2** Reasons for community pharmacists' willingness to provide immunization services

Reasons	Response (%) n = 76	*Level of agreement	
		Disagree n (%)	Agree n (%)
Community pharmacists have good knowledge of vaccine and their indications	60 (78.9)	9 (15.0)	51 (85.0)**
Community pharmacists are easily accessible to the community	57 (75.0)	1 (1.7)	56 (98.3)**
Providing immunization through community pharmacy will improve the rate of vaccination in general	59 (77.6)	5 (8.5)	54 (91.5)**
Providing immunization through community pharmacy will improve the rate of vaccination in a certain age group of patients such as the elderly	51 (67.1)	4 (7.8)	47 (92.2)**
Its cost effectiveness	50 (65.8)	21 (42.0)	29 (58.0)
Community pharmacist can play an important role in advertising and promotion of vaccination	63 (82.9)	8 (12.7)	55 (87.3)**

\*The denominator for the calculation of agreement level is the respective frequency of response for each item and missing values are not included in the analysis  
\*\* $P < 0.001$

community setting. On the other hand, several limiting factors were also identified in this study—for example, lack of training and maintaining patient safety was a concern which requires better education and training in vaccines for both undergraduate pharmacists as well as practicing pharmacists. These results are consisting of several studies that demonstrate the benefit of authorizing the pharmacist to administer vaccines in community settings [22, 23].

In 1997, the American Public Health Association (APHA) encouraged all pharmacists to embrace a level of involvement in providing immunization as either an instructor (promoting vaccinations to patients served), facilitator (adopting for vaccine distribution), or as immunizer (administering immunizations inconsistent with government law) [24]. In order to decrease the risk of infectious diseases and promote vaccine uptake, many countries have expanded the role of pharmacists working in the community pharmacy to provide vaccines. The International Pharmaceutical Federation (FIP)

released a global report on the impact of pharmacists on immunization services and indicated that 13 of the 45 countries allowed pharmacists to administer vaccines in the community setting, including but not limited to: Argentina, Australia, Canada, Costa Rica, Denmark, Ireland, New Zealand, Philippines, Portugal, South Africa, Switzerland, UK, and USA [25]. These countries have recognized the importance of permitting vaccination by pharmacists and have allowed them to provide an immunization service to their communities. This move was supported by several studies which have demonstrated that the addition of pharmacists as immunizers potentially increased the overall immunization rate among the studied populations [19, 22].

Given the large number of visits by a broad range of social class and age groups of both the sick and healthy people, its accessibility and extended opening hours, and potentially low medical cost, community pharmacies offer a unique place for immunization services; there has also been evidence that vaccination through community

**Table 3** Barriers affecting community pharmacists' willingness to provide immunization services

Barriers	Response (%) n = 63	*Level of agreement	
		Disagree n (%)	Agree n (%)
Pharmacists are busy and they have no time to provide immunization	54 (85.7)	24 (44.4)	30 (55.6)***
Will add more work	54 (85.7)	25 (46.3)	29 (53.7)
Patient safety is a concern	46 (73.0)	15 (32.6)	31 (67.4)**
Lack of training	61 (96.8)	15 (24.6)	46 (75.4)**
Pharmacists are less trusted by patients to provide such service	48 (76.2)	24 (50.0)	24 (50.0)
The pharmacies are not designed to accommodate such service	46 (73.0)	29 (63.0)	17 (37.0)
Conflicts with other professionals who eligible to vaccinate	45 (71.4)	22 (48.9)	23 (51.1)
Concerns about handling vaccines, storage, and disposal of sharps	49 (77.8)	27 (55.1)	22 (44.9)
Pharmacists are not comfortable using needles	48 (76.2)	30 (62.5)	18 (37.5)

\*The denominator for the calculation of agreement level is the respective frequency of response for each item and missing values are not included in the analysis  
\*\* $P < 0.001$   
\*\*\* $P < 0.01$

**Table 4** Community pharmacists' (willing and unwilling) responses to elements needed for implementing immunization services

Items	Response (%) n = 139	*Level of agreement	
		Disagree n (%)	Agree n (%)
More university education and training on immunization administration for pharmacists	64 (46.0)	7 (10.9)	57 (89.1)**
Continuous education and training workshops on immunization (increased training on immunization and handling of vaccines)	63 (45.3)	3 (4.8)	60 (95.2)**
Financial reimbursement or adequate remuneration	42 (30.2)	9 (21.4)	33 (78.6)**
Patients' demand	40 (28.8)	4 (10.0)	36 (90.0)**
Providing a specific area for immunization in the pharmacy	58 (41.7)	7 (12.1)	51 (87.9)**
Relieve pharmacists from technical tasks	43 (30.9)	15 (34.9)	28 (65.1)***
Collaboration with medical clinics	46 (33.1)	7 (15.2)	39 (84.8)**
Support of medical and nursing associations	50 (35.9)	10 (20.0)	40 (80.0)**
Pharmacist's specialty interest	49 (35.2)	4 (8.1)	45 (91.9)**

\*The denominator for the calculation of agreement level is the respective frequency of response for each item and missing values are not included in the analysis

\*\* $P < 0.001$

\*\*\* $P < 0.01$

pharmacies is cost-effective compared to a medical setting [26]. In this era of growing healthcare expenditure, the cost of vaccination may impose a financial burden on the government budget. Hence, the benefit of getting vaccines at a community pharmacy will remarkably reduce this pressure on the government budget and have many advantages over other healthcare settings, including but not limited to: extended opening hours, easy access to professional knowledge, convenient locations without requiring an appointment or waiting, and do not charge visit fees [27, 28].

In general, several barriers have been identified as the factors that can contribute to the low immunization rate in any age of adult population and setting. This may include inadequate patient knowledge and erroneous belief about the safety and efficacy of vaccines, longer waiting time, and inconvenient location and working hours of the clinic that provides the immunization services [29]. Therefore, providing vaccination through community pharmacies is an opportunity to overcome this hurdles. Yet, this is hindered by several challenges. Barriers noted include inconsistent reimbursement and compensation mechanisms, limited plans on offer to cover all recommended vaccines, lack of professional development for community pharmacists, and minimal educational programs and certifications, as well as obstacles in accessing health information technology due to the lack of shared patient record systems [24].

While there has been a limited number of published articles and poor quality of available studies in the Kingdom of Saudi Arabia—and this makes it difficult to directly compare pharmacist interventions to other strategies for improving immunization coverage—however, it is clear that vaccination at community pharmacies will likely make a significant contribution towards strengthening immunization programs to the adult population. According

to the law regulating Saudi pharmacy practice, there are 12,506 licensed pharmacists working in approximately 7322 community pharmacies [8]. Like many of the countries that adopted community pharmacy-based immunization programs, expanding the role of community pharmacists to adult immunization in Saudi Arabia would be a great opportunity to overcome the low immunization rate in the country. However, this may require changing the patients' behavior by providing adequate knowledge on vaccinations, and thus, the role of community pharmacists in providing such service is timely and very important for Saudi Arabia. In order to successfully implement such service in Saudi Arabia, it would be beneficial to start with a small-scale exploration of the views of service providers before pharmacy vaccination programs are available to a large public. Before success is evident, this may also be a step taken to find out any gaps that currently exist or may follow in introducing this new role in the community pharmacy. For example, a great attention should be paid to the development of a guideline that embraces pharmacist's immunization practice in the community. This guideline may consists of a range of issues such as requirement for practice (e.g., licensure, certification, and training), vaccines and patients involved (e.g., influenza vaccine, oral, adult), confidentiality of the vaccination data, and how such data would be stored and used to evaluate the effectiveness of pharmacy vaccination programs. Furthermore, the guideline should include policy details regarding the potential safety and severe complications of vaccination service provided by pharmacists and how they will deal with it when this happened.

## Conclusion

Community pharmacies offer a unique place to provide a vaccination service. Implementation of an immunization service may increase the number of adults that would be

vaccinated and ultimately improve their overall health by reducing vaccine-preventable diseases. However, there is a lack of studies of the community pharmacists' perspective regarding readiness and willingness to provide immunization services. The findings of this study indicate that community pharmacists working in Saudi Arabia are willing to provide immunization services. However, overcoming barriers (e.g., lack of training) identified in this study is a key to success, and this, in turn, provides the guidance for future planning and implementation of immunization services. Future larger studies are needed to explore the patients' willingness and acceptability to receive immunizations from their community pharmacists.

#### Abbreviations

APHA: American Public Health Association; CDC: Center for Communicable Disease Control; FIP: International Pharmaceutical Federation; UK: United Kingdom; USA: United States of America

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#### Availability of data and material

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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#### Authors' contributions

BB, TMH, and MAM designed the study. BB, TMH, and MAM analyzed and interpreted the data. BB and MAM drafted the first manuscript. ABM, MA, THM, LGP, and HA critically reviewed and revised the manuscript. All authors have read and approved the final manuscript.

#### Ethics approval and consent to participate

This study was approved by the King Saud University ethics approval number 1/2016.

#### Consent for publication

Not applicable.

#### Competing interests

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#### References

- Centers for Disease Control and Prevention (CDC). Adult vaccination coverage—United States, 2010. *MMWR. Morbidity and Mortality Weekly Report*. 2012;61(4):66–72. <https://www.cdc.gov/mmwr/preview/mmwrhtml/mm6104a2.htm>.
- Williams WW, Lu PJ, O'Halloran A, Kim DK, Grohskopf LA, Pilishvili T, Skoff TH, et al. Centers for Disease Control and Prevention (CDC) surveillance of vaccination coverage among adult populations—United States, 2014. *MMWR Surveill Summ*. 2016;65(1):1–36.
- McLaughlin JM, McGinnis JJ, Tan L, Mercatante A, Fortuna J. Estimated human and economic burden of four major adult vaccine-preventable diseases in the United States, 2013. *J Prim Prev*. 2015;36(4):259–73. <https://doi.org/10.1007/s10935-015-0394-3>.
- Ozawa S, Portnoy A, Getaneh H, Clark S, Knoll M, Bishai D, et al. Modeling the economic burden of adult vaccine-preventable disease in the United States. *Health Affair*. 2016; <https://doi.org/10.1377/hlthaff.2016.0462>.
- CDC. Recommended immunization schedule for adults aged 19 years or older, United States, 2017. Available at: [www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf](http://www.cdc.gov/vaccines/schedules/downloads/adult/adult-combined-schedule.pdf). Accessed 5 Jan 2017.
- Al-Khashan HI, Selim MA, Mishriky AM, Binsaeed AA. Meningitis and seasonal influenza vaccination coverage among military personnel in central Saudi Arabia. *Saudi Med J*. 2011;32(2):159–65.
- WHO Director-General addresses vaccine and immunization research forum. WHO. 2014. Available at: <http://www.who.int/dg/speeches/2014/research-uhc/en/>. Accessed 5 Jan 2017.
- Ministry of Health. Statistical Yearbook. Available at: <http://www.moh.gov.sa/en/ministry/statistics/book/pages/default.aspx>. Published 2014. Accessed 5 Jan 2017.
- Memish ZA, Jaber S, Mokdad AH, et al. Burden of disease, injuries, and risk factors in the Kingdom of Saudi Arabia, 1990–2010. *Prev Chronic Dis*. 2014; 11:E169. <https://doi.org/10.5888/pcd11.140176>.
- Johnson DR, Nichol KL, Lipczynski K. Barriers to adult immunization. *Am J Med*. 2008;121(7 SUPPL. 2) <https://doi.org/10.1016/j.amjmed.2008.05.005>.
- Kimmel SR, Burns IT, Wolfe RM, Zimmerman RK. Addressing immunization barriers, benefits, and risks. *J Fam Pract*. 2007;56(2 Suppl Vaccines):S61–9. doi:jfp\_0207\_5602u [pii]
- Plans-Rubió P. The vaccination coverage required to establish herd immunity against influenza viruses. *Prev Med (Baltim)*. 2012;55(1):72–7. <https://doi.org/10.1016/j.jypmed.2012.02.015>.
- Traynor K. With Maine on board, pharmacists in all 50 states can vaccinate: H1N1 prompts emergency vaccination rules for pharmacists. *Am J Health Syst Pharm*. 2009;66(21):1892–4.
- Evans AM, Wood FC, Carter B. National community pharmacy NHS influenza vaccination service in Wales: a primary care mixed methods study. *Br J Gen Pract*. 2016;66(645):248–57. <https://doi.org/10.3399/bjgp16X684349>.
- PSA. Practice guidelines for the provision of immunization services within pharmacy. <http://www.psa.org.au/download/practice-guidelines/immunisation-guidelines.pdf>.
- Edwards N, Corsten E, Kiberd M, Bowles S, Iseonor J, Slayter K, et al. Pharmacists as immunizers: a survey of community pharmacists' willingness to administer adult immunizations. *Int J Clin Pharm*. 2015;37:292–5. <https://doi.org/10.1007/s11096-015-0073-8>.
- Ministry of Health. Pharmacist vaccinators. Available at: <http://www.health.govt.nz/our-work/preventative-health-wellness/immunisation/immunisation-programme-decisions/pharmacist-vaccinators>. Accessed 5 Jan 2017.
- Taitel M, Cohen E, Terranova B, Baloun L, Kirkham H, Duncan I, Pegus C. Pharmacists as immunization providers: patient attitudes and perceptions. [August 19, 2017]; *Pharmacy Times* 2011 Available at: <http://www.pharmacytimes.com/publications/issue/2011/September2011/Pharmacists-as-Immunization-Providers-Patient-Attitudes-and-Perceptions>. Accessed 5 Jan 2017.
- Saudi Food and Drug Authority. Saudi Arabia pharmaceutical country profile. 2012. Available at: [http://www.who.int/medicines/areas/coordination/Saudi\\_ArabiaPSCP\\_Narrative2012-04-18\\_Final.pdf](http://www.who.int/medicines/areas/coordination/Saudi_ArabiaPSCP_Narrative2012-04-18_Final.pdf). Accessed 4 Jan 2018.
- Iseonor JE, Edwards NT, Alia TA, Slayter KL, MacDougall DM, McNeil SA, et al. Impact of pharmacists as immunizers on vaccination rates: a systematic review and meta-analysis. *Vaccine*. 2016;34(47):5708–23. <https://doi.org/10.1016/j.vaccine.2016.08.085>.

21. MOH. Executive regulation of Pharmaceutica products and facilities; 2014. <https://www.moh.gov.sa/en/Ministry/Rules/Documents/Executive%20regulation%20of%20Pharmaceutical%20products%20and%20facilities.pdf>. Accessed 5 Feb 2017.
22. Usami T, Hashiguchi M, Kouhara T, Ishii A, Nagata T, Mochizuki M. Impact of community pharmacists advocating immunization on influenza vaccination rates among the elderly. *Yakugaku Zasshi*. 2009;129(9):1063–8. doi:JST.JSTAGE/yakushi/129.1063 [pii]
23. Valiquette JR, Bédard P. Community pharmacists' knowledge, beliefs and attitudes towards immunization in Quebec. *Can J Public Health*. 2015;106(3): 89–94. <https://doi.org/10.17269/CJPH.106.4880>.
24. Goad J, Bach A. The role of community pharmacy-based vaccination in the USA: current practice and future directions. *Integr Pharm Res Pract*. 2015;4. <https://works.bepress.com/goad/21/>. Accessed 15 Feb 2017.
25. Rosado H, Bates I. An overview of current pharmacy impact on immunisation. A global report. FIP. 2016. [https://fip.org/files/fip/publications/FIP\\_report\\_on\\_Immunisation.pdf](https://fip.org/files/fip/publications/FIP_report_on_Immunisation.pdf). Accessed 5 Feb 2017.
26. Grabenstein JD, Hartzema AG, Guess HA, Johnston WP, Rittenhouse BE. Community pharmacists as immunization advocates: cost-effectiveness of a cue to influenza vaccination. *Med Care*. 1992;30(6):503–13.
27. Goad JA, Taitel MS, Fensterheim LE, Cannon AE. Vaccinations administered during off-clinic hours at a national community pharmacy: implications for increasing patient access and convenience. *Ann Fam Med*. 2013;11(5):429–36. <https://doi.org/10.1370/afm.1542>.
28. Papastergiou J, Folkins C, Li W, Zervas J. Community pharmacist-administered influenza immunization improves patient access to vaccination. *Can Pharm J (Ott)*. 2014;147(6):359–65. <https://doi.org/10.1177/1715163514552557>.
29. High KP. Overcoming barriers to adult immunization. *J Am Osteopath Assoc*. 2009;109(6):25–8.

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